A paper was read, entitled, "An Experimental Investigation of the Phenomena of Endosmose and Exosmose." By William Ritchie, Esq., M.A., F.R.S., Professor of Natural Philosophy in the Royal Institution of Great Britain.

M. Porret had, in the year 1816, announced the discovery, that if a vessel containing water be divided into two compartments by a diaphragm of bladder, and placed in the voltaic circuit, the water would rise on the negative side above its level in the positive compartment. M. Dutrochet discovered, that if alcohol be placed in one of the chambers, and water in the other, without employing the voltaic battery, the water will percolate through the bladder, and the fluid will rise in the chamber containing the alcohol: an action to which he gave the names of *Endosmose* and *Exosmose*, according to its direction with regard to the side of the membrane considered; comparing its two sides to those of a Leyden jar in opposite electrical states. This electrical theory has been combated by M. Poisson: but the true explanation of this singular phenomenon does not appear to have been yet given.

The experiments of the author, of which an account is given in this paper, were made with a glass tube, about an inch in diameter, one end being drawn out into a slender tube of the interior diameter of one eighth of an inch, and having a piece of bladder tied over the other end. When this *Endosmometer*, as it has been called, is by means of a small funnel introduced into the narrow end filled with alcohol, and immersed in water, the water penetrates through the bladder, and the spirit rises rapidly in the narrow stem. The author found on trial that this action was apparently not affected by a powerful current of voltaic electricity passed through the bladder, by introducing positive and negative wires on both sides of it. On substituting a strong solution of sulphate of zinc for the alcohol, the same negative result was obtained.

The author considers the action of the animal membrane to be the consequence of its strong attraction for water, an attraction to which it owes its hygrometric properties: while, on the other hand, the membrane has no attraction for alcohol, which has itself a powerful attraction for water. The water, therefore, finds its way easily through the membrane, and uniting with the alcohol, is carried off by it, and diffused through the liquid, making room for the other portions that successively come over. Whalebone and quills have similar hygrometric properties, and may be substituted for membranes with the same effect. All substances readily soluble in water give rise to the phenomena of endosmose, on the same principle as alcohol, such as gum, sugar, and salts. The phenomenon bears a striking resemblance to the rise of the sap in the capillary vessels of plants, both being probably dependent on the same principle; the filamentous texture of the roots performing the function of the membrane, and the contained sap that of the attractive fluid; by the agency of which that external moisture of the earth is imbibed and raised into the interior of the plant.